

## **Fabrication of 2D photonic crystals in chalcogenide glass membranes by focused ion beam milling**

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We describe the production of chalcogenide glass photonic crystals in films of AMTIR-1 glass. Chalcogenides have sufficiently high refractive index (2.4-3.0) to create a photonic bandgap as well as a high third-order optical nonlinearity (100-1000x silica) and may be useful for all-optical switching [1-2].

300nm thick AMTIR-1 films were deposited by ultrafast pulsed laser deposition on 50nm thick SiN<sub>x</sub> windows prepared by anisotropic chemical etching of nitride coated silicon wafers. The crystal structures were fabricated using a focused ion beam (FIB) to mill away unwanted material from the SiN<sub>x</sub> side to create high quality lattices with periods of  $\approx$ 500nm. Optical tests showed clear signs of Fano resonances in the angle dependence of the transmission spectra. This technique of fabricating photonic crystals allows arbitrary shapes to be made with <100 nm resolution.

[1] A. Zakery, Y. Ruan, A. V. Rode, M. Samoc, and B. Luther-Davies, *J. Opt. Soc. America B: Opt. Phys.*, **20**, 1844-1852 (2003).

[2] C. Grillet, D. J. Moss, D. Freeman, S. Madden, B. Luther-Davies, and B. J. Eggleton, submitted for *PECS-VI*, (2005).